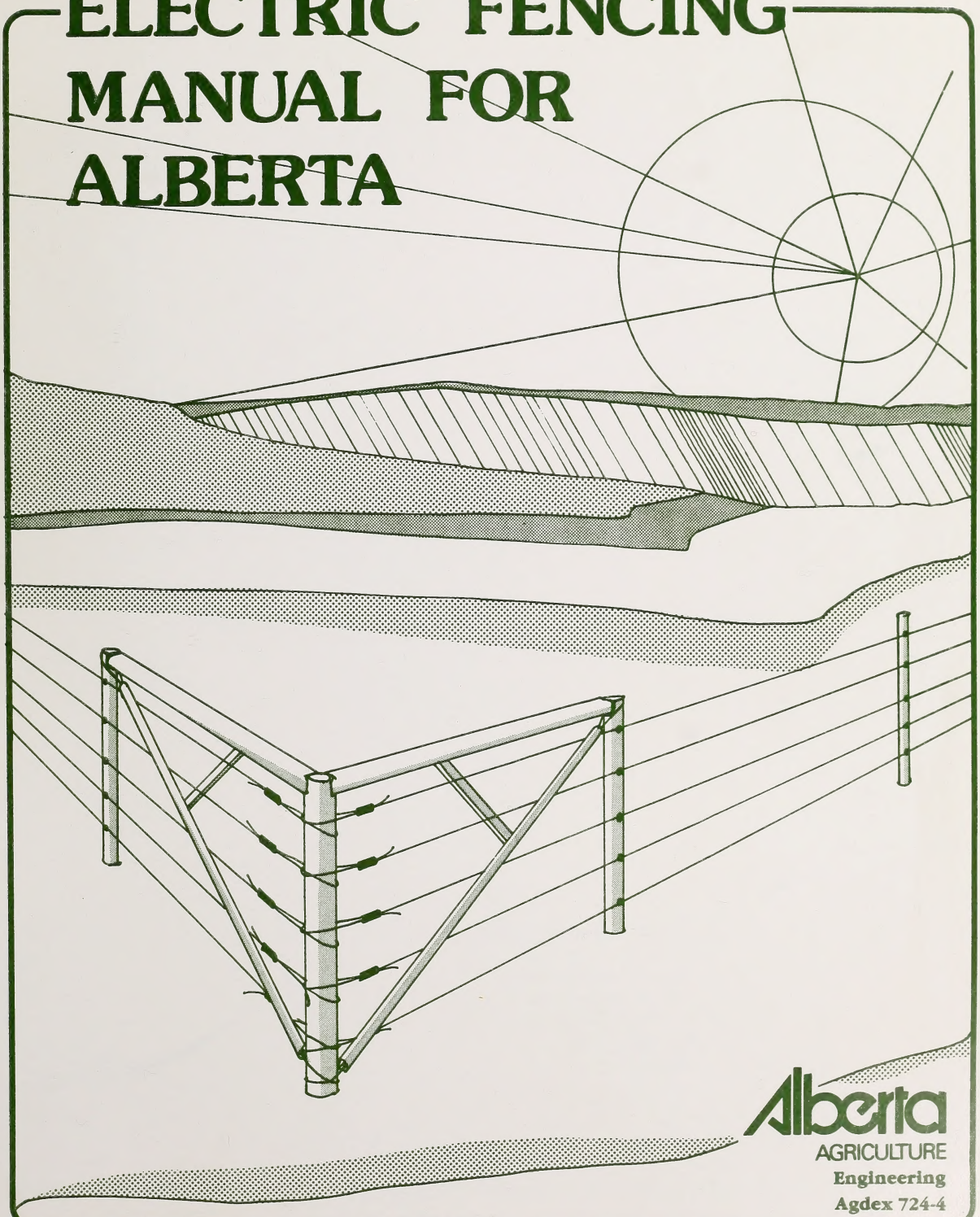
ELECTRIC FENCING MANUAL FOR ALBERTA



Alberta
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Agdex 724-4

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ELECTRIC FENCING MANUAL FOR ALBERTA

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INTRODUCTION

Planning permanent electric fences of high-tensile smooth wire is, in many respects, similar to planning non-electric high-tensile smooth wire fences. For this reason, the information in High-Tensile Smooth Wire Fencing Manual for Alberta, Agdex 724-3, applies to electric fences as well. The main difference is that electric fences require the regular delivery of a reliable electric shock to contain livestock and turn away predators. Electric fences are chosen for the ease, speed, and economy with which large areas of land can be enclosed and subdivided. Farmers and ranchers should plan and erect their fences so that at some future time the fence can be modified or even electrified without a great deal of trouble or expense. This can be done by building the initial fence according to the High-Tensile Smooth Wire Fencing Manual for Alberta, Agdex 724-3. Fortunately, many electric fence designs are effective even when the current is switched off, or they can be modified for seasonal or permanent non-electric use with relatively small additional materials and labour.

An electric fence is a psychological barrier rather than a physical barrier. An electric fence works because the animal is afraid to touch it. This fear is learned when the animal itself touches the fence or sees its effect on another animal. This respect for the fence is the key to the success of electric fencing. Once trained, the animal will not normally come into contact with the fence. This means little or no pressure on the fence. This means that the post and dropper spacings can be increased. The numbers of wires used, wire tensions, post size and strainer strength can be reduced. All these factors represent a capital and construction cost saving.

When an electric fence is properly constructed and a powerful electronic energizer is used, 80 km (50 miles), of fence can be effectively electrified.

The lifespan of a high-tensile smooth wire electric fence could be expected to be about 30 years. To ensure that the fence lasts it must be constructed of quality materials and top workmanship. The location of the fence should be chosen to fit long-term management plans. It is uneconomical to move a fence which has a 30 year life in 5 or 10 years because of improper planning or construction methods.

Various electric fencing manufacturers and distributors claim different capacities, so these specifications should be matched to your fence.

Electric fences can be used in a variety of situations:

- management (i.e.) strip grazing
- protection of marketable crops
- predator control
- protection of existing fences
- protection of domestic animals from hazards

The three areas of planning covered here are for:

- permanent fencing
- temporary fencing
- electrifying existing fences.

PERMANENT FENCING

Whether you choose to electrify one or more wires on a fence to train livestock or predatory animals to stay in or out of a fenced-in area, or do so to protect the fence, the basic requirements are the same. A well built electric fence should:

- cope with the animals in question
- be sturdy enough to withstand initial attacks by untrained animals
- deliver an effective but safe electric shock every time the animals touch the wires.

While this may appear simple, building permanent electric fences requires good long-term planning, a practical knowledge of electricity and the effects of electric shock on humans and other animal species.

Experience and testing have shown that an electric fence must deliver a certain minimum voltage to the animal to be effective:

- long-haired animals - 2000 volts minimum
- short-haired animals - 700 volts minimum

Various materials and construction techniques are outlined in this manual to attain this voltage.

FENCE DESIGNS

Wire Spacing must be such that the animal will receive a shock on its face or ears when challenging the fence, and not be large enough to allow more than the animal's head through. The fence should not appear as a physical barrier that the animal will not challenge.

Alternating ground wires with live wires is important where precipitation is low (i.e. less than 700 mm annually) or rainfall distribution is poor. This is certainly true in Alberta. The purpose of the ground wire is to complete the electrical circuit when soil conditions would otherwise form poor ground return.

LIVESTOCK FENCE DESIGNS

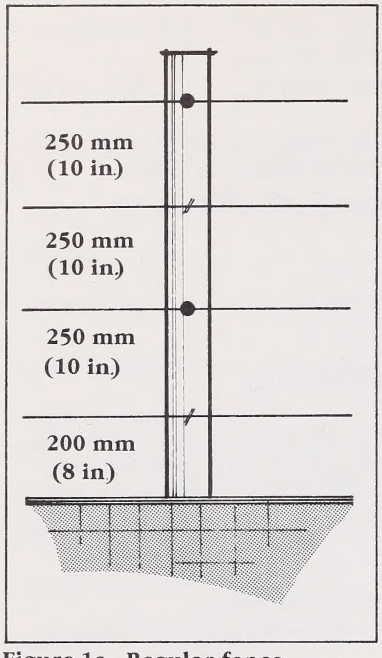


Figure 1a. Regular fence - low rainfall

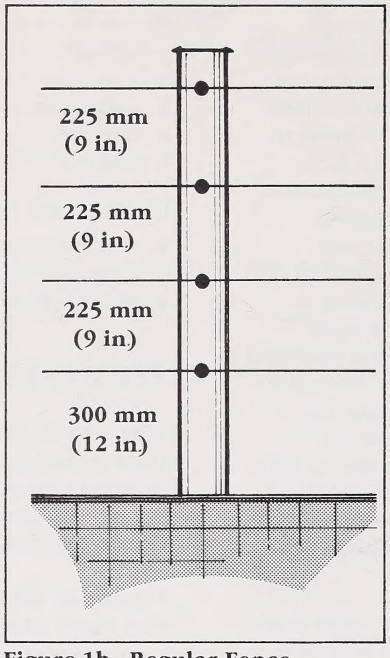


Figure 1b. Regular Fence - high rainfall

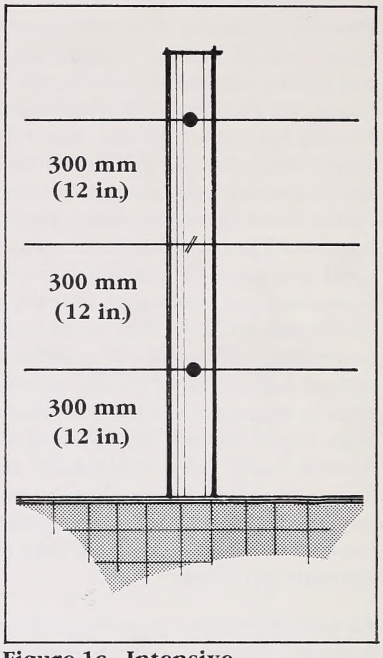


Figure 1c. Intensive management fence - low rainfall

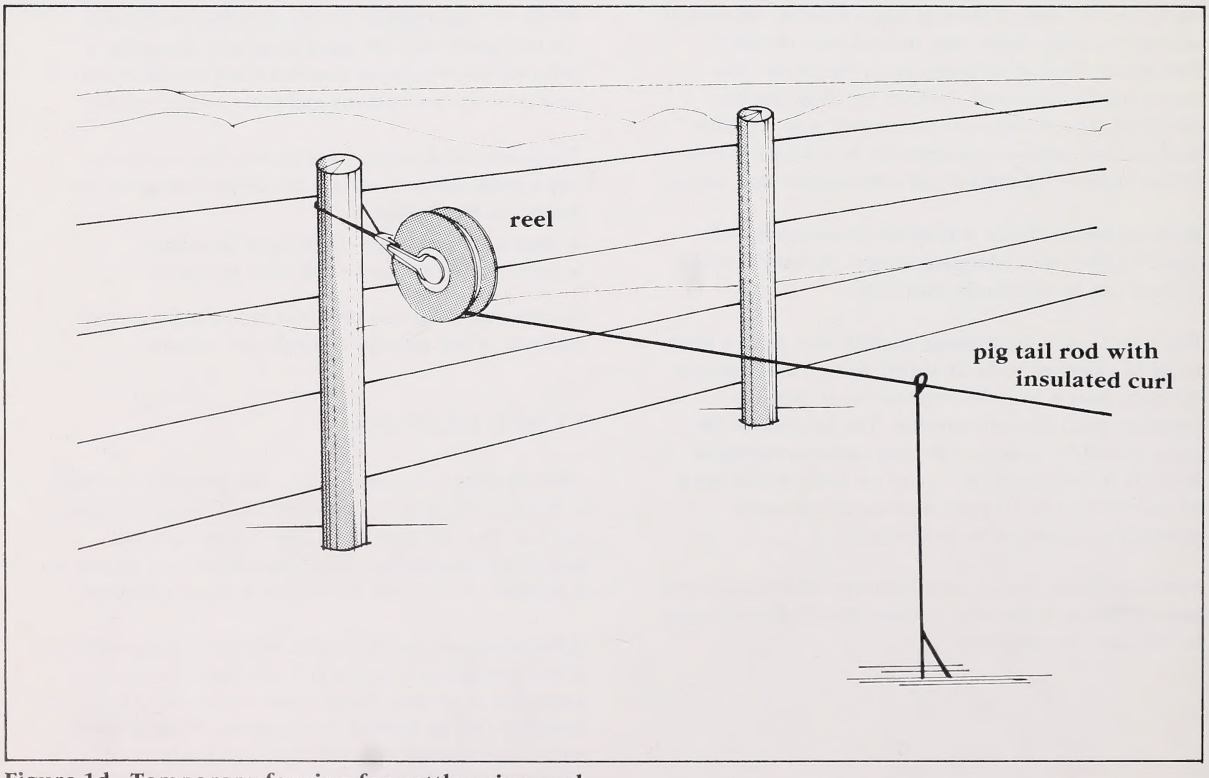


Figure 1d. Temporary fencing for cattle using reel.

LIVESTOCK FENCE DESIGNS

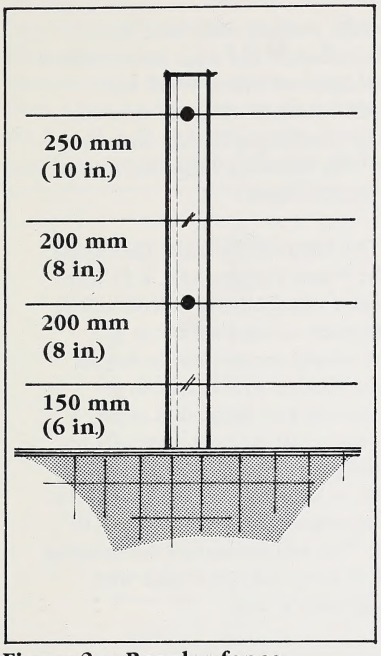


Figure 2a. Regular fence - low rainfall

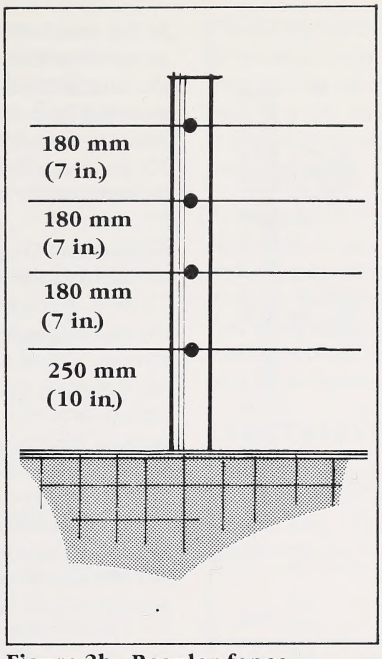


Figure 2b. Regular fence - high rainfall

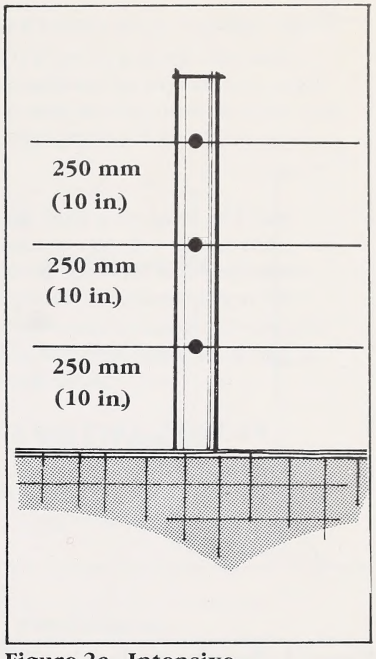


Figure 2c. Intensive management fence - high rainfall

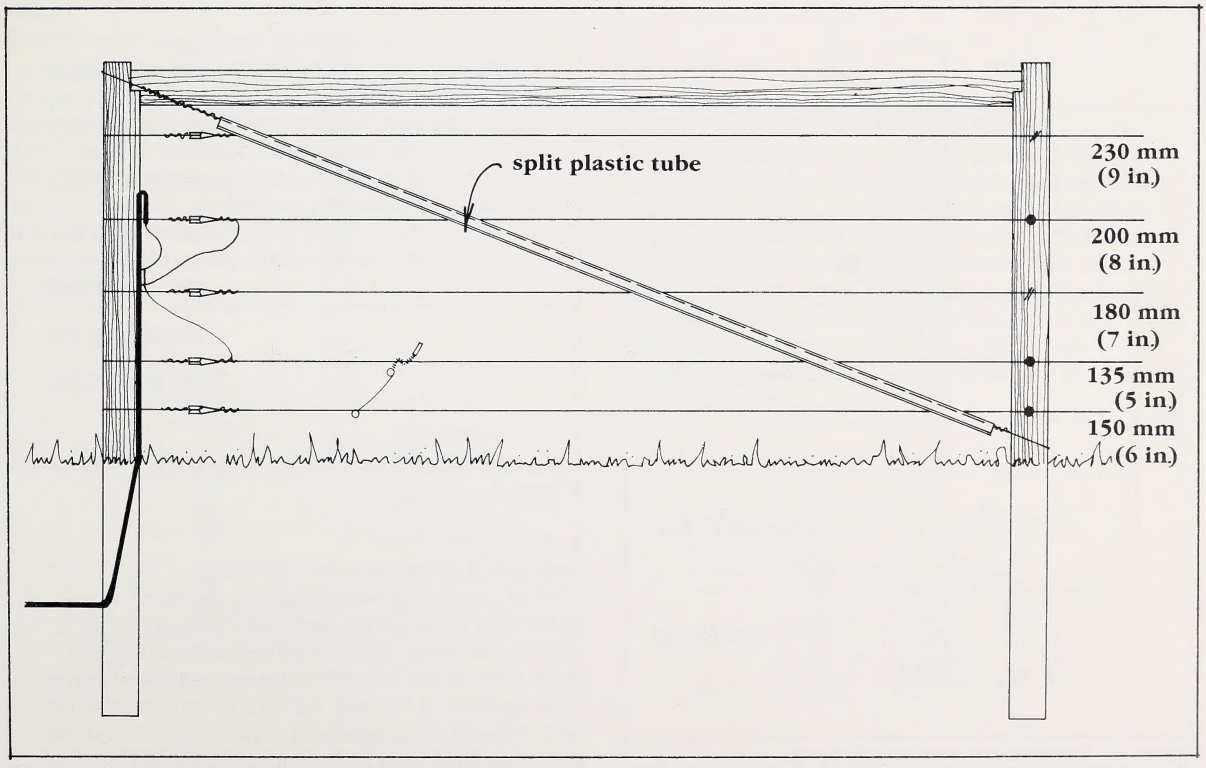


Figure 2d. Permanent fence for sheep with a brace assembly. (5 wire design)

LIVESTOCK FENCE DESIGNS

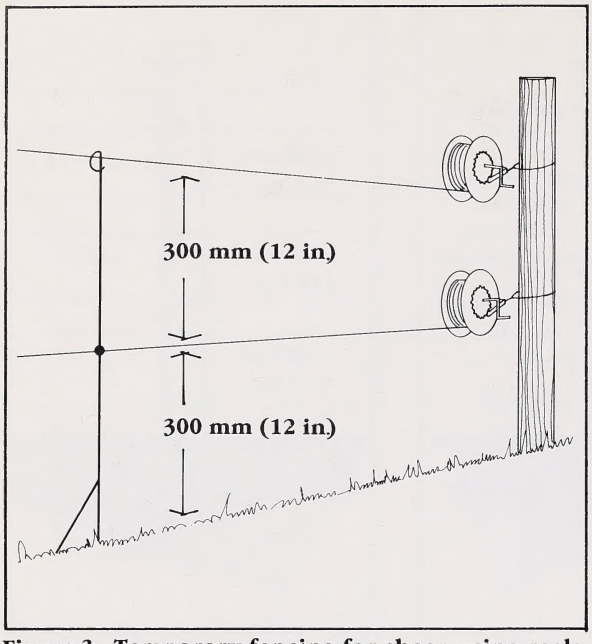


Figure 3. Temporary fencing for sheep using reels.

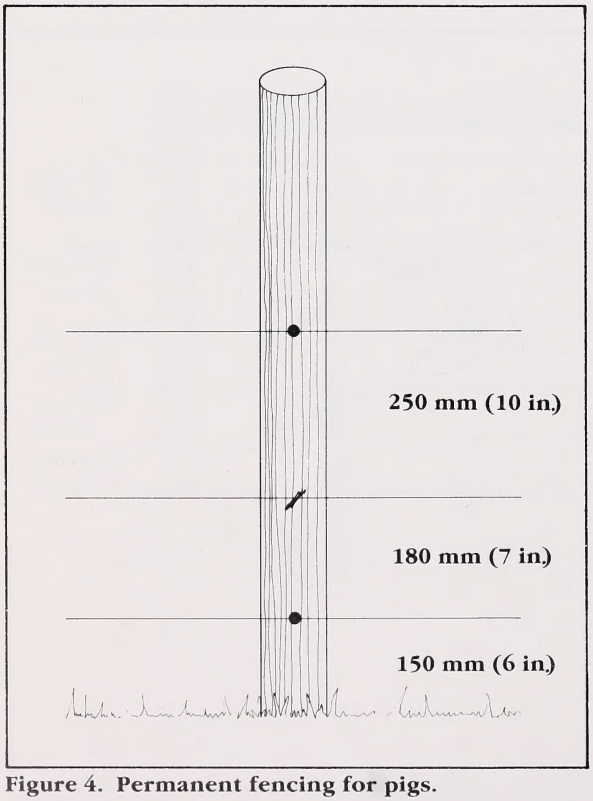


Figure 4. Permanent fencing for pigs.

WILDLIFE CONTROL FENCE DESIGNS

In this relatively new field various trials have been undertaken with mixed success. The trials have covered the control of coyotes, deer and bears. Work has generally been directed towards finding the most cost effective methods. Very few designs to date have been 100 per cent effective. The following suggestions might be incorporated in a wildlife fence.

Coyotes and Dogs - The design must entice the coyote or dog to challenge the fence. For example, a 13 wire, 1.5 m (5 ft) fence places a visual barrier in front of the coyote enticing him to jump rather than try to go through. Going higher simply means that the coyote will dig under the fence. Design wire spaces large enough to attract the animal and tempt him to go through the fence but not so large that he actually fits. Remember that live and ground wires placed too close together will also result in tangling and shorting of the fence. The design incorporates a live wire 150 mm (6 in.) above the ground. This will necessitate the spraying of a 150 mm (6 in.) wide strip under the fence with permanent-kill chemical once a year.

The wires must alternate between positive and ground to ensure the animal receives a shock.

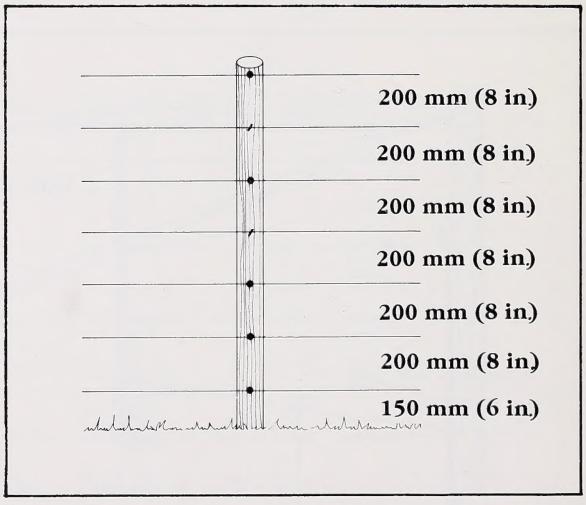


Figure 5.

Deer - Wire spaces must be such that the deer are enticed into challenging the fence rather than jumping. The deer fence designs used in trials across North America are too many to list, but range from fences with 45° slants to two parallel fences close together. A five wire 1.5 m (5 ft) vertical fence has been reported to be successful in excluding white-tailed deer from farm crops in Pennsylvania. The B.C. Ministry of Agriculture and Food is currently

evaluating an experimental seven wire 2.1 m (7 ft) vertical fence to exclude both white-tailed and mule deer from an Okanagan orchard. This design is illustrated below. The B.C.M.A.F. is also testing a seven wire 2.4 m (8 ft) vertical fence to exclude elk from a hay stockyard in the East Kootenays. Contact the B.C.M.A.F. for trial results, designs and specifications for electric deer or elk fences.

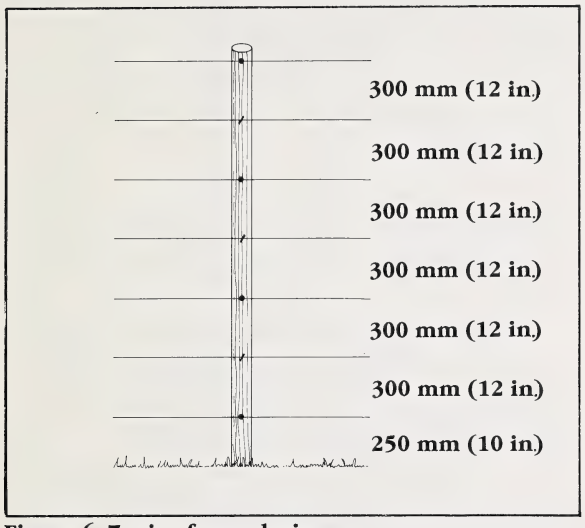


Figure 6. 7 wire fence design.

Bears -

Electric fences can control bears around beehives. One successful design is shown below. All wires on the fence are live. Excellent grounding is supplied by laying and pegging a length of chicken netting or page wire on the ground around the fence. This is connected to a ground rod or directly to the ground terminal of the energizer. While standing on the page wire the bear will receive a high energy pulse by touching any wire. The use of barbed wire has proven successful but is not recommended.

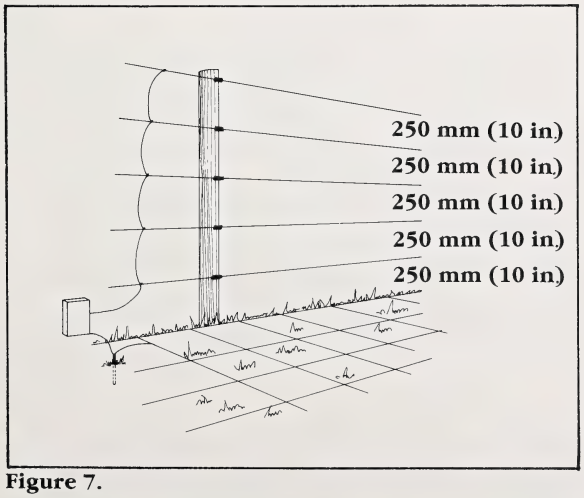


Figure 7.

TEMPORARY FENCING

Temporary fencing has a variety of uses: perhaps one of the most important is for strip grazing. Basically, strip grazing involves confining the animals to a small area for a few days and then moving them to a new area. It goes without saying that grazing stock always need a source of water.

A temporary or movable fence is designed and built differently from a permanent one. It is lighter and easier to put up and take down while still keeping the stock in. One strand high-tensile smooth wire at two-thirds animal height is sufficient for temporary electric fencing, a fence height of 800 - 900 mm (30 - 35 in.) is suitable for most domestic stock.

ELECTRIFYING EXISTING FENCES

Existing fences can be electrified by attaching a wood support to the tops of the existing fence posts every 6 to 10 m (20 to 30 ft) to support an electrified high-tensile smooth wire.

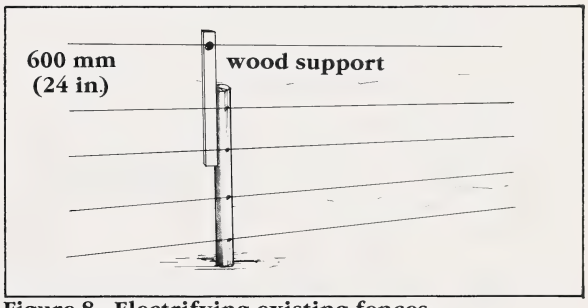


Figure 8. Electrifying existing fences.

A second method of electrifying an existing fence is to use an offset bracket. The offset bracket slips onto the existing fence wires or can be stapled to the line posts if desired. The offset bracket holds a high-tensile smooth wire 225 mm (9 in.) away from the fence. This prevents shorting out and ensures that the animals will touch the electrified wire first. The offset bracket should be positioned about two-thirds of the height of the animals to be controlled and spaced about 6 to 12 m (20 to 40 ft) apart.

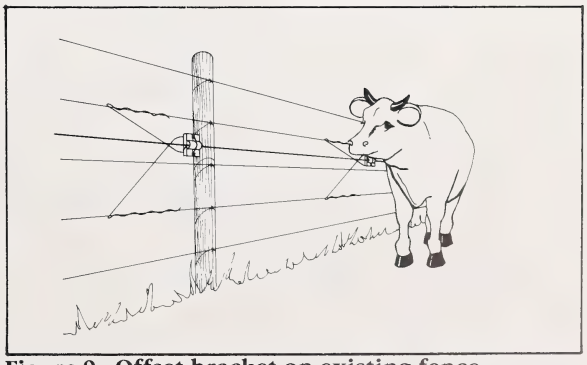


Figure 9. Offset bracket on existing fence.

MATERIALS

An electric fence has four essential components - the **energizer** which supplies and regulates the pulse, the **wire** which carries the pulse and forms a visual and psychological barrier, the **posts** which support the wires, and finally the **insulators** which prevent loss of voltage where the wire is anchored to the post.

ENERGIZERS

Selecting Energizers - A modern electric fence energizer operates somewhat like an electronic ignition in a car. First a capacitor, which is capable of storing electrical energy is slowly charged up over a period of 1/3 to 1/2 second. Then a separate timing circuit discharges or releases the energy from the capacitor through a transformer. The transformer steps up the voltage.

One lead from the energizer is connected to a ground rod and the other to the fence. The animal touches the fence wire while standing on the ground, thus completing the circuit (energizer to wire to animal to ground to energizer) and hence receives a shock.

Electric fence energizers use solid-state design (without moving parts), which not only release high voltage (5000 or higher) and have low impedance (good resistance to shorting out in high leakage situations), but operate economically and within the safety requirements.

The types of energizer include:

- mainline "plug-in" models - 110-220 volt
- rechargeable wet cell battery powered - 12, 24, 32 volt
- replaceable dry cell battery powered - 6, 9, 12 volt

Manufacturers and distributors of electric fence energizers can provide very informative literature on models they offer, as well as detailed instructions on their installation, operation and maintenance.

Mainline "Plug-in" Energizers - If mainline power is available, 110 or 220 volt plug-in energizers are usually more practical for use on permanent fences, since they require no battery maintenance. Generally they are more expensive than nonplug-ins, but their performance may well justify the additional cost. Most plug-in models have higher rated outputs than battery types and can energize longer fences, fences with several electrified wires, or fences subject to high leakage from heavy vegetation growth.

When purchasing an energizer, ensure that it is CSA approved. All plug-in energizers should be mounted indoors or in a weather proof structure.
Use a feeder wire to connect the energizer to distant fences.

Battery Powered Energizers - For fences in areas where mainline power is not available or feasible, there are a number of battery-powered energizers which use a 3 to 32 volt power supply. These have high outputs (5,000 volts) and can energize fences with several kilometres of wire.

The most popular battery-powered energizers use a 12 volt rechargeable wet cell battery. Some of these are capable of putting 5,000 volts into a fence line. Most models are designed to conserve battery power, which limits their effectiveness to relatively short fences (8 km [5 miles] of wire), and fences are comparatively free from leakage.

Most models powered by dry cell batteries are effective only on relatively short or temporary fences and should be considered inadequate for long fences or in high leakage situations.

Manufacturers usually indicate the length of wire their energizer will electrify. But is important to realize that this refers to the quantity of wire and not a straight line distance. In practice, a fence should never exceed a continuous distance of 20 km (12-13 miles) for maximum effectiveness. Energizers are able to produce a powerful pulse because they have a low internal resistance. However, this effect is lost in long fences. So locating the energizers centrally is important.

Even the most powerful energizers meet standards which ensure their safe operation when correctly installed. An important point is to buy the correct size of unit for the amount of electric fencing likely to be erected.

Some companies offer a wind generator to energize remote fences. Another alternative is the use of a photovoltaic panel that recharges a battery by using solar energy, both of these are expensive at the present time.

Conventional 12 volt automobile or tractor batteries can be used to power energizers, however, many such batteries, regardless of their ampere ratings, are not designed to be totally discharged before recharging.

If a battery is totally discharged it can only be recharged up to 60 per cent or 75 per cent of its original capacity. If the battery cannot be recharged or exchanged when it is about half discharged — (about every three weeks) consider the use of a 100 ampere hour, heavy duty industrial or so called deep discharge battery.

Caution - "Home-made" electric fence energizers especially those utilizing 110 volts or 220 volt inputs have been known to kill both humans and animals, and

to start fires. For these reasons, the use of homemade energizers, as well as so-called "weed-burner" models and those with long "on" periods, or which release electricity continuously into the fence wires should be avoided.

Under no circumstances should more than one energizer be connected to the same fence. If more than one energizer is required for any reason, each should be installed only on separate segments of fences, at least 2 m (6 ft) spacing between fence wires.

WIRE

The type and size of wire used with an electric fence is important. For a permanent electric fence, high-tensile smooth galvanized wire is the proper choice. The high tensile properties are important because the wire will not sag or get sloppy under snow load or constant tension. 12.5 gauge high-tensile smooth wire is a good size as it is visible to animals and humans. The voltage drop is also lowered by using the larger wire. The smooth wire is better than the barbed wire because it is safer. The use of barbed wire on any fence to be electrified should be avoided to prevent humans and animals from being caught on the barbs and suffering serious injuries or death from psychological, if not electrical shock.

POSTS

Proper corner posts are the most important part of the fence, these should be heavier 150 mm - 200 mm (6 to 8 in.) diameter than the line posts 50 mm - 75 mm (2 to 3 in.) diameter. Lighter line posts are used just to hold up the wire at proper spacings.

With high-tensile smooth wire electric fences it is not necessary to space the line posts at a fixed distance. Space each line post as the contour of the terrain dictates.

On level terrain it is possible to space the line posts up to 12 m (40 ft) maximum.

When terrain is not level the line post spacing could be as little as 4 m (12 ft) to keep the correct wire height.

Posts should be driven perpendicular to the surface of the ground. Not following this procedure will reduce the height of the fence.

Steel T Bars are not ideal for permanent electric fencing because of the danger of shorting. A T Bar post does not have a good grip in loose or wet ground and tends to lean. On temporary fences or for strip grazing, round 8 mm (5/16 in.) diameter hot dip posts have proven very popular. A good quality insulator should be used to insulate the wire from the post.

Pressure treated wood is traditionally the most popular type of material for posts and braces. One major advantage of wood is its natural resistance to electric current flow, but this can vary over an extremely wide range depending on the type of wood, how dry it is, what type of preservative has been used etc. Most preservatives increase the conductivity of wood so insulators are required. Insultimber* is a wood post which does not require insulators or preservatives; this is a new concept which is not fully proven.

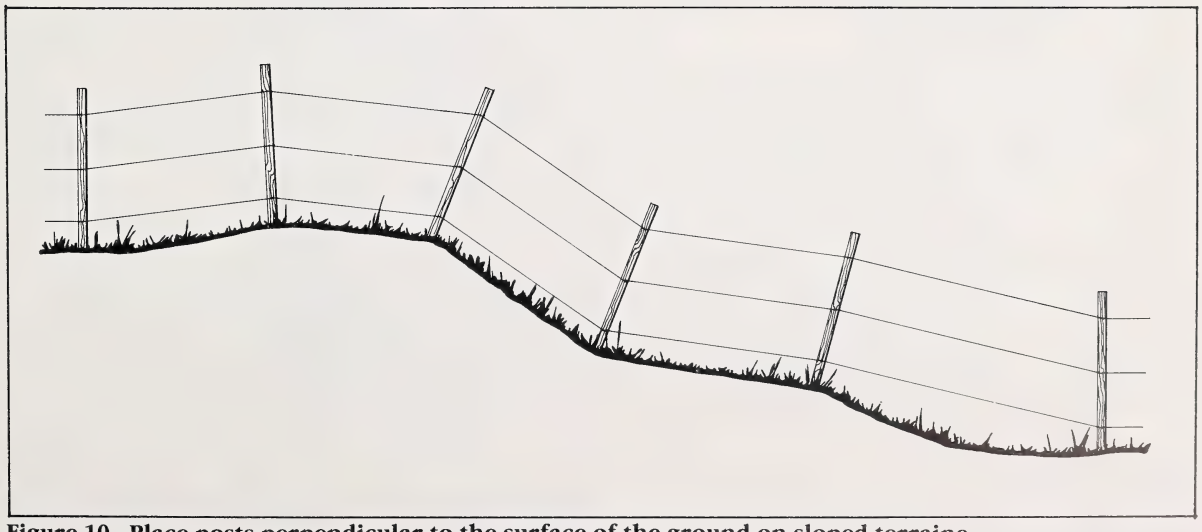


Figure 10. Place posts perpendicular to the surface of the ground on sloped terraine.

* *Brand Name*

Plastic and fibreglass posts are convenient and easy to use because of their light weight, self insulating ability and flexibility. However, all plastic deteriorates in the sun, even fibreglass. Good fibreglass posts have a 10 to 20 year lifespan. A number of plastic posts are available for strip grazing and temporary fencing; since they are not intended for permanent installation, degradation from sunlight is not a big drawback. Another disadvantage of plastic is that it becomes more brittle as the temperature drops.

INSULATORS

With plastic or fibreglass posts, insulators are not required. For all other types of posts, good quality insulators should be used. **Insulators** are used to anchor the wire to wood or steel posts and insulate the wire from the post. There are two major types of insulators — porcelain and plastic. Good quality porcelain will last longer than plastic. However, porcelain has three major disadvantages.

1) Insulators are easily broken if hit or if the wire is overtightened.
2) They generally have to be threaded onto the wire so replacing a broken insulator is very inconvenient and usually involves cutting the wire.
3) They are relatively expensive.

Some plastic insulators become brittle under sunlight and can lose some of their insulating qualities in as little as five years. Modern, high density types, however, are designed to withstand sunlight, but like porcelain, they all deteriorate under the extremes of climate. High density polyethylene or polypropylene insulators have been found to maintain their insulating properties after 10 years of use.

Nail or staple insulators - Several types of molded black plastic insulators are available. They are fastened to the posts with galvanized nails or staples that are furnished with them. Care should be taken not to drive the nails or staples too deeply so as to distort the insulators. These insulators are high-density black polypropylene, which does not become brittle in extremely cold weather or deteriorate quickly in sunlight.

Corner insulators are made of porcelain or black polyethylene; these are used for insulating wires to be tensioned at the end, corners and gate locations.

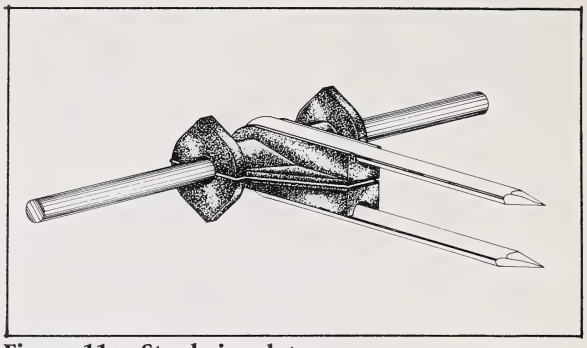


Figure 11a. Staple insulator.

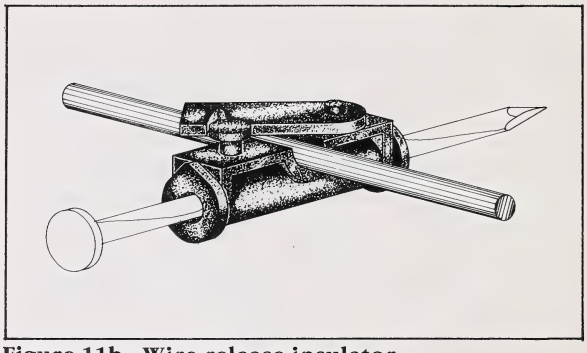


Figure 11b. Wire release insulator.

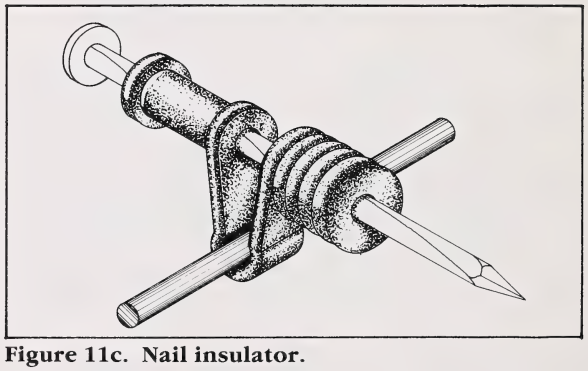


Figure 11c. Nail insulator.

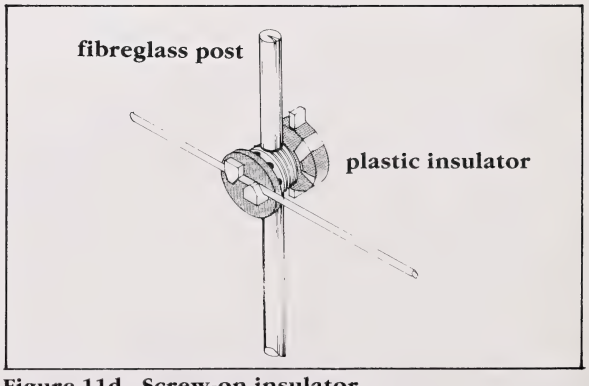


Figure 11d. Screw-on insulator.

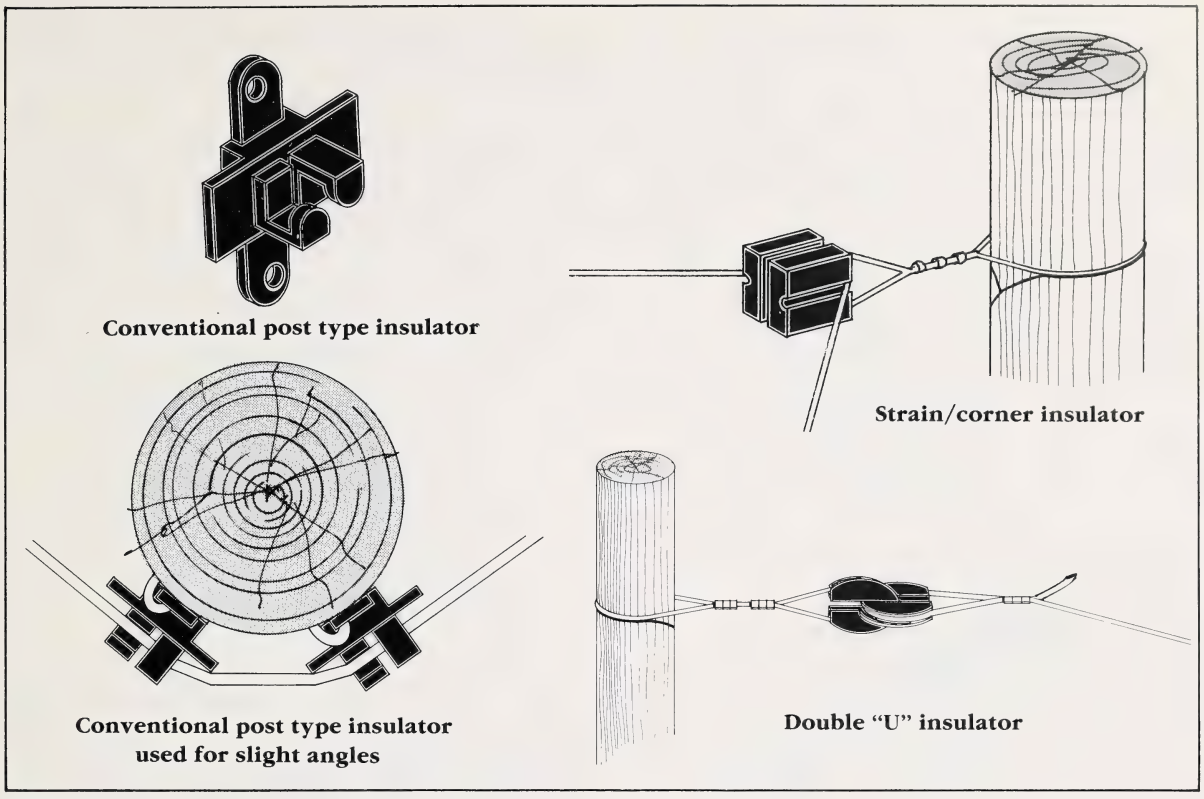


Figure 12.

Insulated adjustable in-line wire strainers - These are similar to those used for nonelectric fences. The only difference is that a built-in insulator is included to isolate line wires from tie wires. One in-line wire strainer is required per wire segment. These are used to maintain correct seasonal tension on medium to short electric fences. During the winter, tension on the wires should be reduced or a spring assembly should be used.

Avoid using plastic tubing as insulators around posts. This type of insulator can hold water, dust and insects, causing the wires to corrode or short out. Wires that

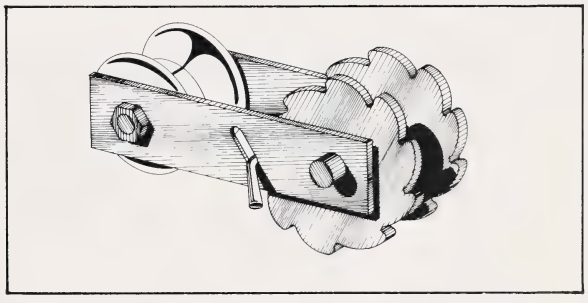
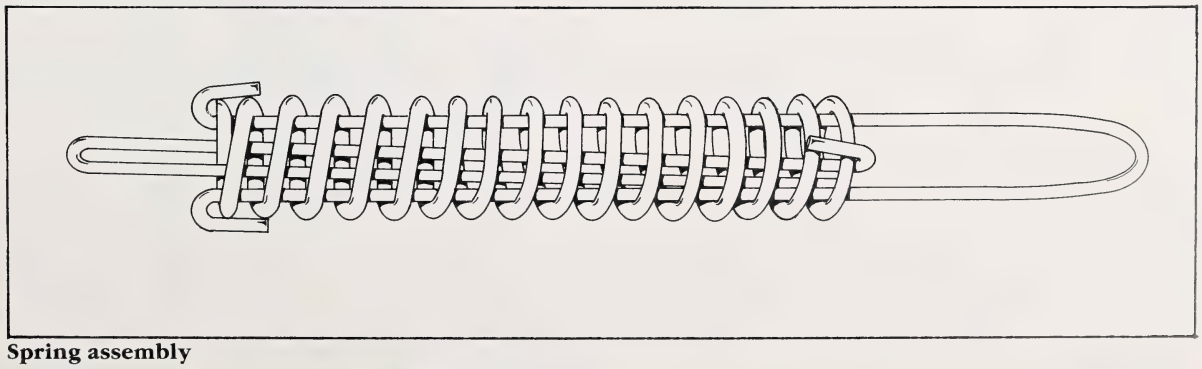


Figure 13. Insulated adjustable in-line wire strainer.



Spring assembly

are under pressure and insulated with plastic tubing will eventually cut through the plastic tubing.

Some insulators are designed with long or angular leakage paths or water barriers to prevent electrical leakage resulting from arcing. Some are hinged to permit removing and reattaching the wires without removing the fasteners or cutting the wire.

Some advertisements for electric fence energizers state that insulators are not required. It is true that a sufficiently powerful energizer still can charge a fence if insulators are not used, at least for a short distance. It is like plumbing your house and not bothering to solder or clamp the joints. Water will still get to the tap but a lot of water will be lost along the way. For quality workmanship and durability, it is just not sensible to reduce the effectiveness of your electric fence to save a handful of insulators.

Installing insulators - In electric fences, it is essential that all wires move freely during tensioning, and to allow for movement of the wires during expansion and contraction caused by temperature variations. This is equally important when stapling over insulators. Care should be taken to neither drive the staples too deeply so as to distort the insulators or crack them, nor to create friction which would not allow the wire to move freely.

WIRE CONNECTORS

Wires should never be twisted together in the middle or at the end of the line. They could be joined together with either a figure eight or reef knot.

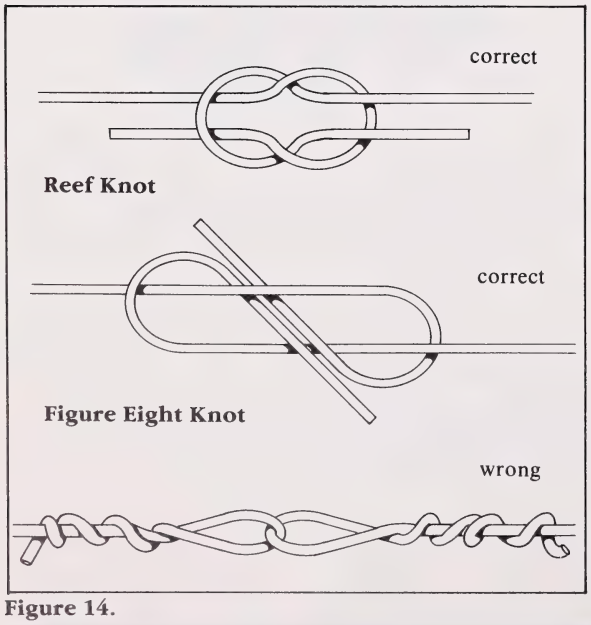


Figure 14.

To make a good connection wires should be connected together with either crimping sleeves, solderless connectors, screw-type line clamps or flexible connectors.

Crimping sleeves should be used in tying-off the wire at the end posts or connecting joints. Three crimping sleeves are strong enough for high-tensile smooth wire electric fencing—these must be crimped with a crimping tool.

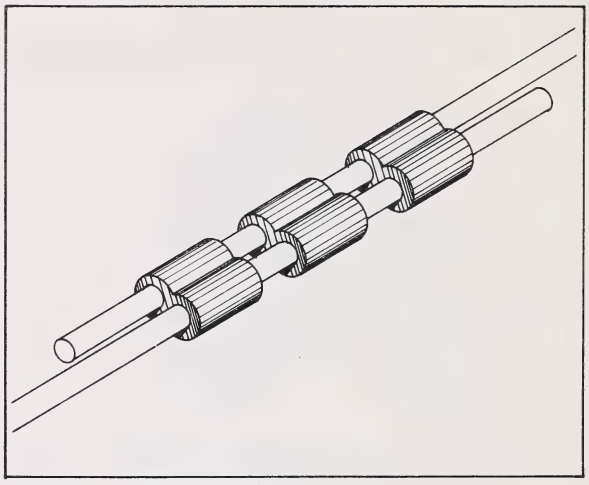


Figure 15. Crimping sleeves.

Solderless connectors provide a means of tapping feed or ground wires into live wires already installed on the fence.

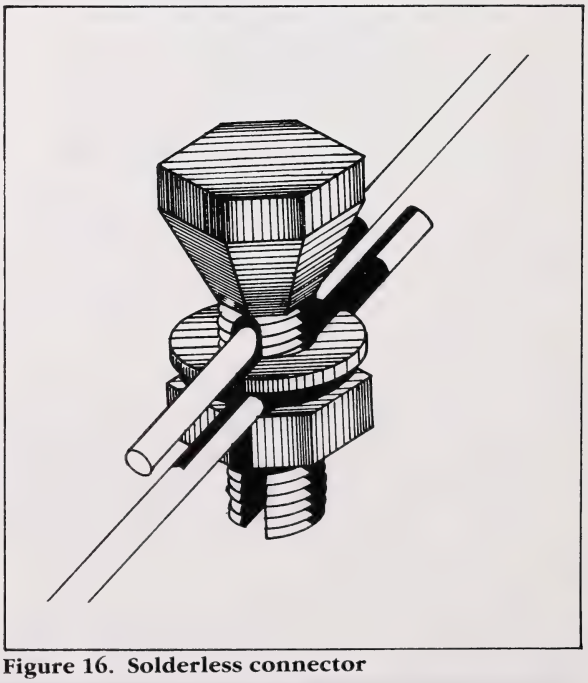


Figure 16. Solderless connector

Line clamps provide another quick and easy method for tapping feed wires or ground wires into live wires already strung.

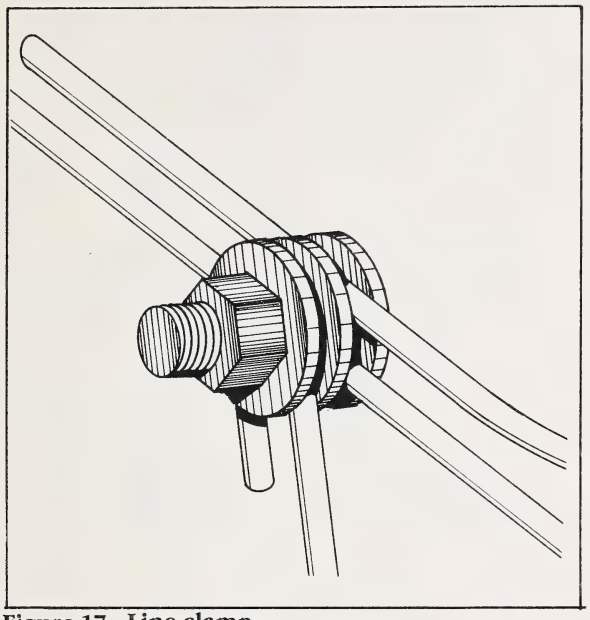


Figure 17. Line clamp.

Flexible connectors are used to disconnect the bottom wire to reduce the demand on the energizer once the animals are fully trained or if there is heavy spring vegetative growth.

Flexible connectors should never be used to supply power into the main fence line because they are not reliable.

Cut-out switches - These are used to switch off selected segments of wires on the fence. They are used to isolate segments of fence for fault finding or maintenance. Cut-out switches must be installed between the live wires or behind tie-offs in corners or ends where there is no tension on the wires. As some cut-out switches are not designed for outdoor use, they should be enclosed or protected from rain, ice and snow.

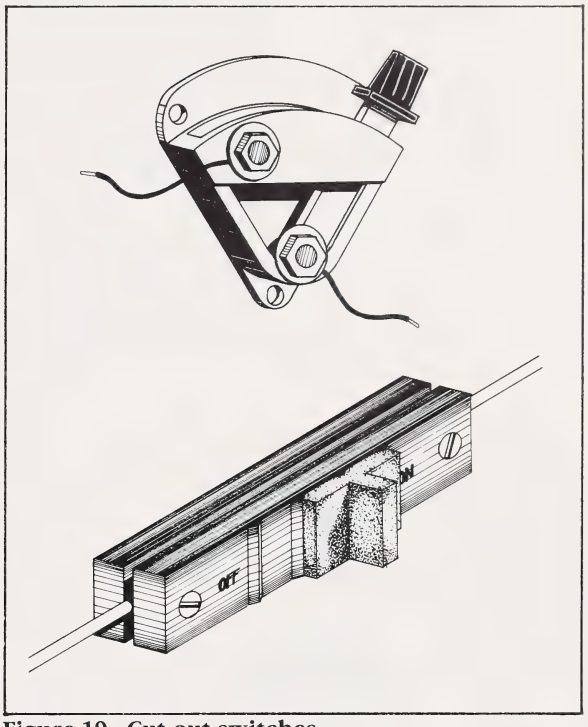


Figure 19. Cut-out switches.

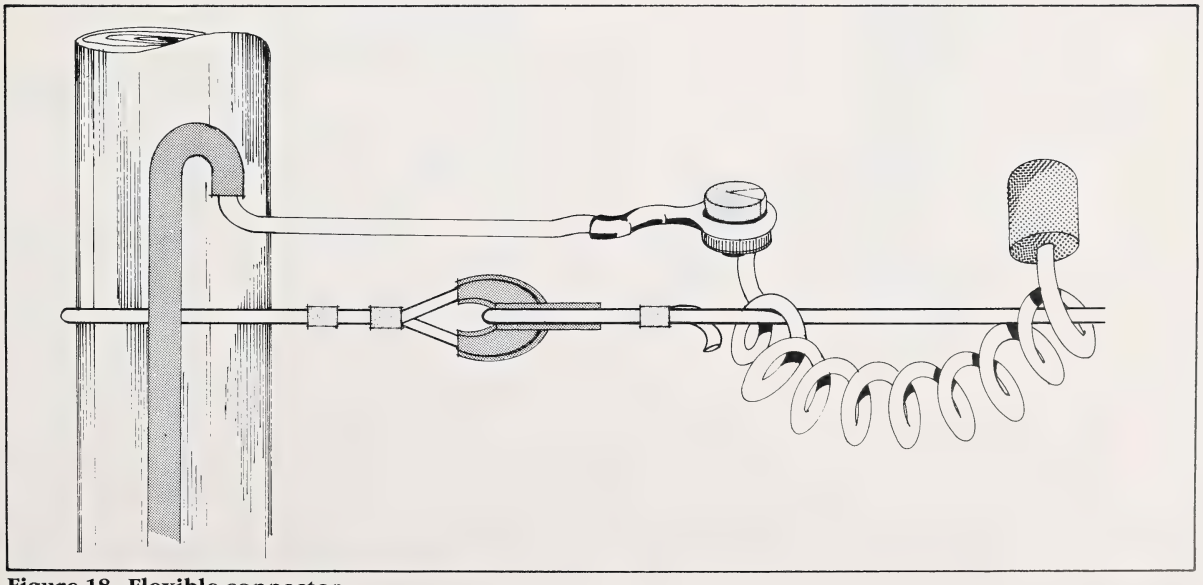


Figure 18. Flexible connector.

JOINT SEALANTS

Problems can occur when two dissimilar metals are joined, for example, when fastening a galvanized wire to a copper clamp. If moisture is present, one of the metals will develop "galvanic" surface corrosion which will result in a poor electrical contact between the two dissimilar metals. This can be delayed or prevented by coating these joints with a non-drying sealant.

TENSION

Hand tighten wires sufficiently to take the dish out of them and create an aesthetically pleasing fence. Do not overtighten. Use the permanent wire strainer for adjusting tension at later dates. Most failures in fence construction are caused by overtightening the wire. A tension meter is relatively simple to make. Take a piece of wood 3.5 m (42 in.) long and place nails 3.3 m (40 in.) apart. Use a spring scale that will measure 9 kg (20 lb) and pull wire as illustrated in the diagram to deflect 13 mm (0.5 in.).

Read the scale and multiply by 20, i.e., if the scale reads 2.2 kg (5 lb), tension on the fence is approximately 45 kg (100 lb). Set tension of the wire at 45 kg to 68 kg (100 to 150 lb) — make sure it never exceeds 68 kg (150 lb). In cold areas reduce tension on wire over winter — a 50°C change alters tension by 45 kg (100 lb).

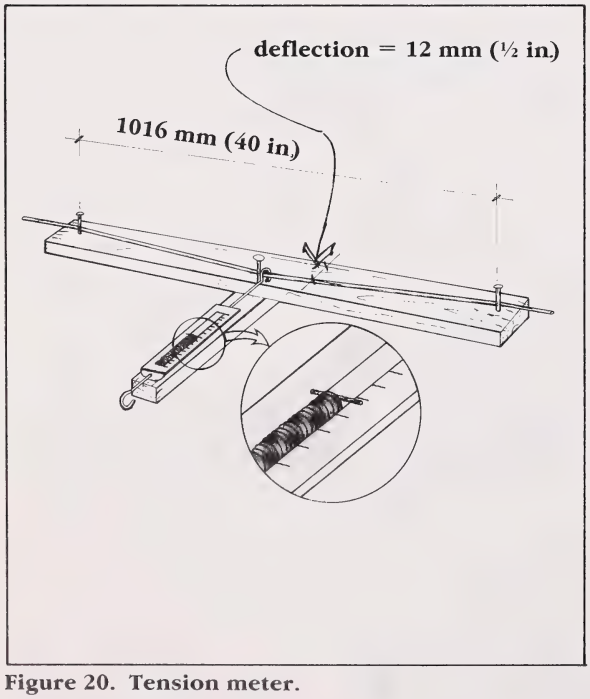


Figure 20. Tension meter.

TYING-OFF

Tying wire to the insulators — leave a tail long enough so that it can be taken to a common wire. Then clamp all wires plus the energized wire together and attach to that common wire. Continuous wires provide a better conductor than separate jumper wires added later.

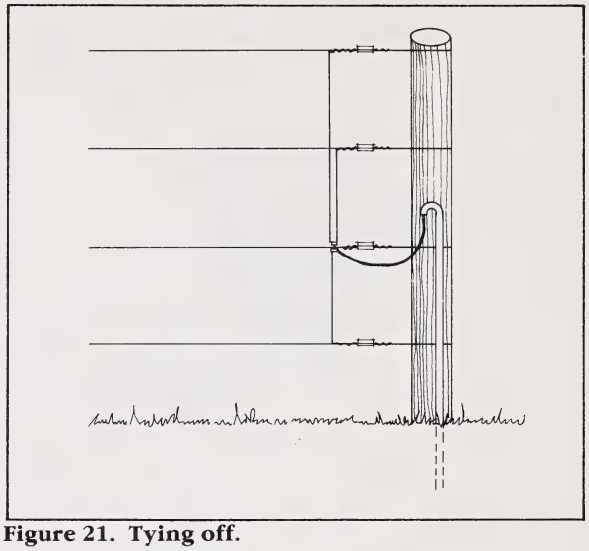


Figure 21. Tying off.

When crossing a live wire past a ground wire use a plastic tube to avoid shorting.

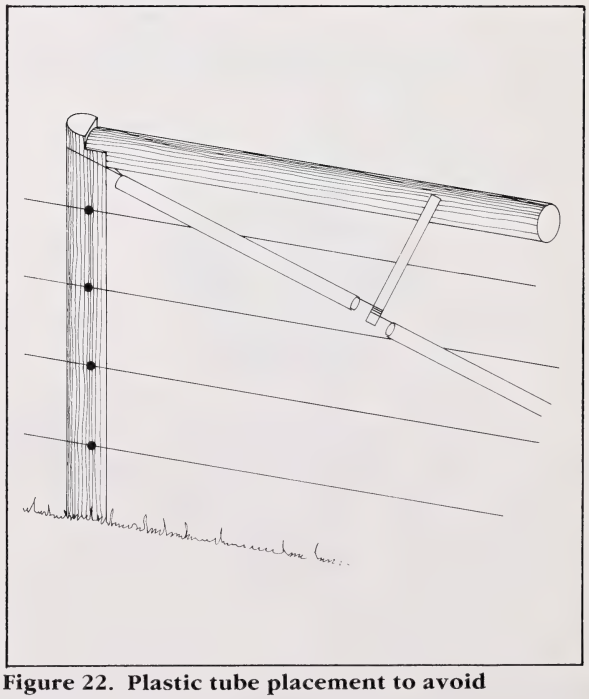


Figure 22. Plastic tube placement to avoid shorting.

GROUNDING THE ELECTRIC FENCE

It is extremely important to properly ground electric fences. In general, at least one 3 m (10 ft) long rod is the minimum for good grounding of a permanent or temporary electric fence. Attach the ground terminal of the energizer to the ground rod. Make sure the connections are tight and protect them from corrosion with anti-corrosion paste or the equivalent and check the connection each season.

Place your ground rods where the ground wire cannot be damaged or disconnected by stock or machinery. A permanently damp location or low spot is best; this may be up to 1 km (0.5 mile) away from the energizer.

Correct splicing of ground wires is as important as splicing live wires.

Having one or more wires on an electric fence as ground wires is recommended. Ground wires on a fence help to complete the electrical circuit when soil is dry.

Ground Rods and Clamps - Ground rods of 3 m (10 ft) should be driven and wired to the ground return wires on the fence at 450 m (1,500 ft) intervals in dry conditions and at 730 m (2,400 ft) intervals in areas with even rainfall, for the entire length of fence.

One screw-type, approved Ground Rod Clamp—designed to fit both 16 mm (⅝ in.) rods and 19 mm (¾ in.) pipe is required for each ground rod or pipe used.

Test for Sufficient Grounding - With the energizer operating, short out the fence at least 100 m (300 ft) away from the energizer with some steel rods, then touch the ground rod and soil. If the fence is operating properly you should **not** feel any electric current. If you do feel a current, make sure the connections are tight, and try again. If there is still a current between the ground and the soil, you will need another ground rod. Place the new ground rod about 2 m (6 ft) away and connect it to the other. Repeat the test, adding more ground rods if necessary, until you do not feel any current.

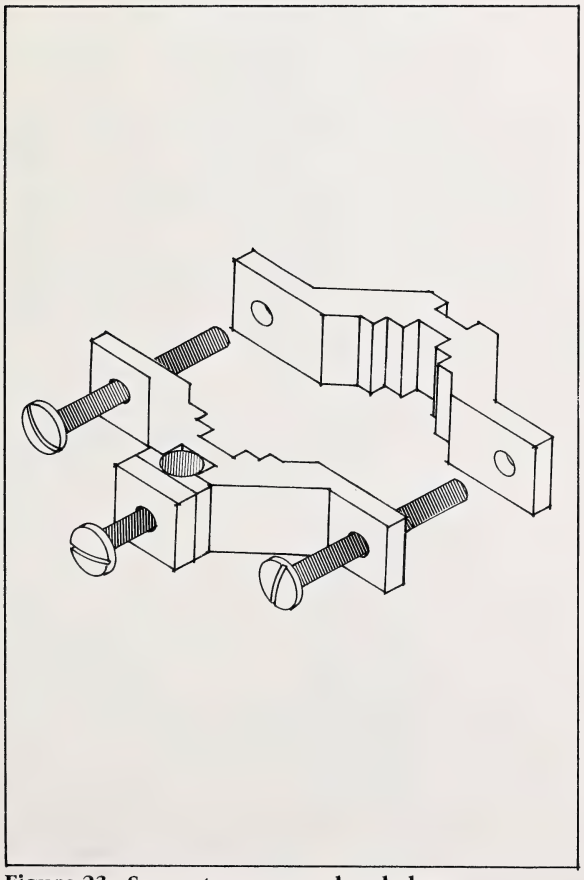


Figure 23. Screw-type ground rod clamp.

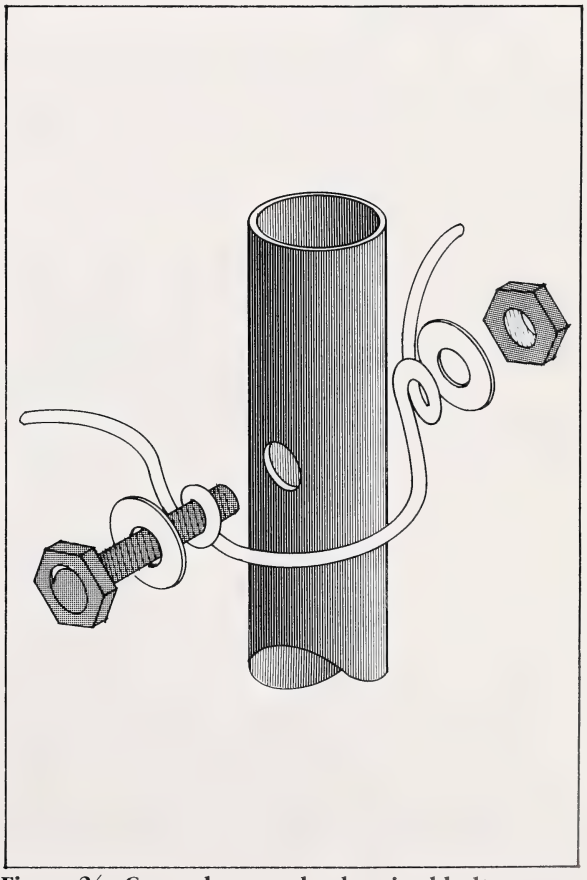


Figure 24. Ground peg and galvanized bolt.

GATES

Many spring loaded wire gate handles, connectors, cut-out switches and fence lift mechanisms are commercially available.

Gates should be installed on the gate post at the brace assembly on which the wires have been tied-off.

Gates should always be electrified from the latch end, that way, when the gate is open and lying on the ground, the fence will not short out.

A typical gate is a single hot wire, extending across the gate opening. This is suitable for a one wire fence. The additional wire in the fence is carried underground beneath the gateway, or overhead.

A light weight swinging gate can be made from 19 mm (¾ in.) galvanized pipe. It looks like a long H frame with insulated electric wires running between the uprights of the H. A U shaped latch can be used to lock the handle closed. Tension on the top wire keeps the wide gate straight. The gate can be made up to 4.8 m (16 ft). It swings by the means of light hinges. The correct tension can be maintained in the wires by inserting permanent strainers or by using an eye bolt on the end of each wire.

In some cases, once animals have become trained to electric fences, it is virtually impossible to get the animals through wire gateways even when the current is switched off and the gate is down.

The use of fabricated gates or planks on the brace

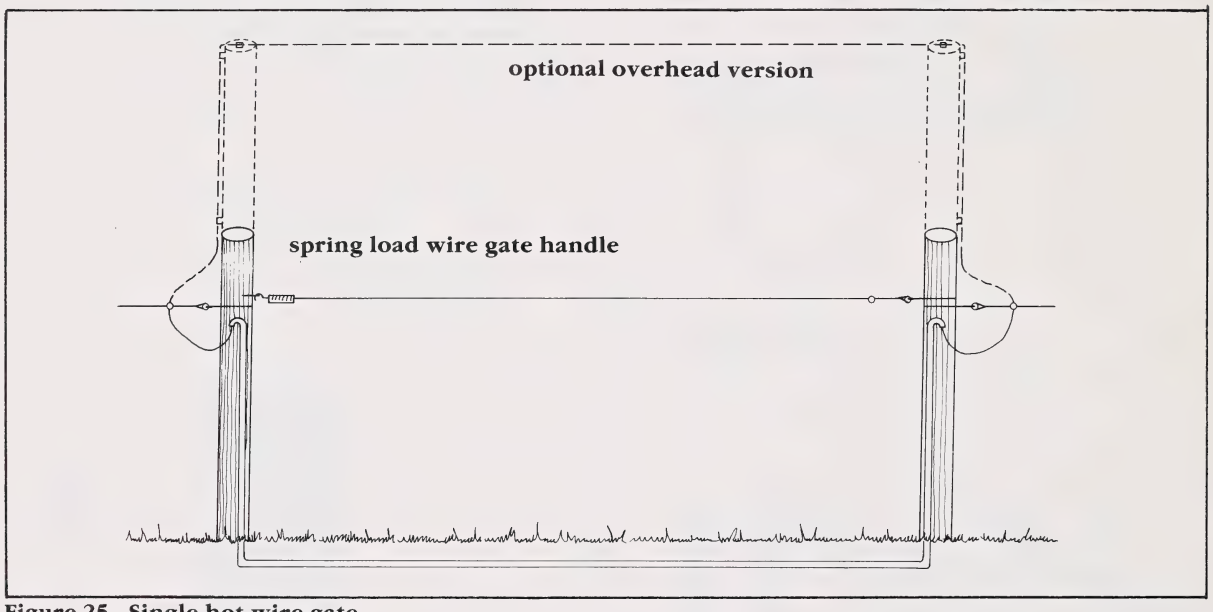


Figure 25. Single hot wire gate.

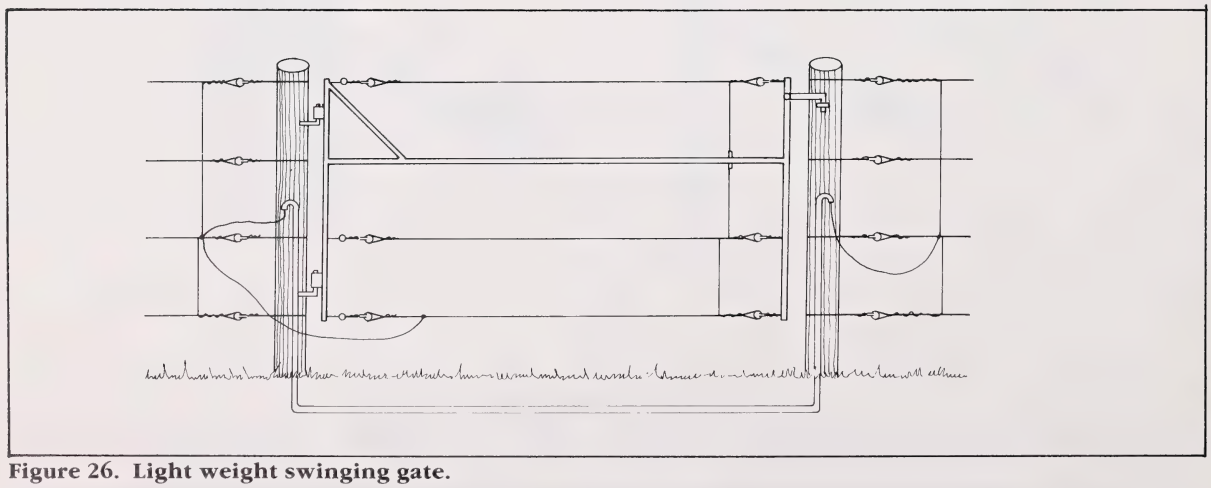


Figure 26. Light weight swinging gate.

* *Brand Name*

assembly to distinguish the gateway will help encourage the passage of animals through gateways.

Conventional farm gates, fabricated of galvanized steel tubing or pressure treated lumber are very versatile and practical gates for electric fences. These can be electrified, if necessary, by the use of insulators or Insultimber*, high-tensile smooth wire and a little ingenuity.

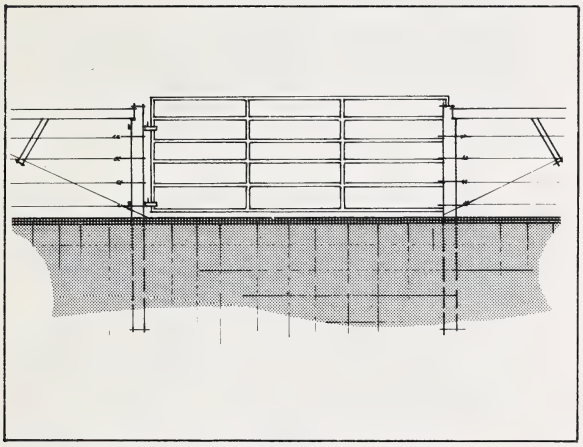


Figure 27. Conventional gate.

When underground wires are carried beneath a gateway, proper protection of the wire is essential. The underground wires have to be protected with plastic pipe and buried at least 500 mm (20 in.) in the ground.

The end of the plastic pipe is brought up alongside the gate post, then bent down to keep any water out of the pipe so as to prevent corrosion.

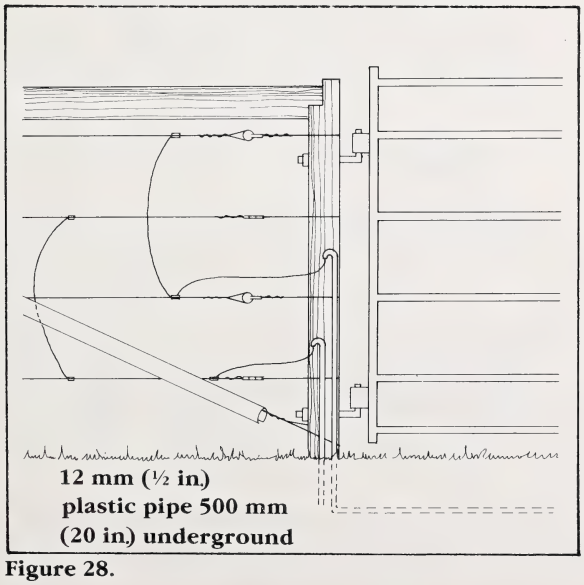


Figure 28.

FLOOD GATES

For electric fencing across ditches or runoff channels subjected to periodic flooding, flood gate controllers are available. They cut off power to the wires submerged in the water, but maintain power in the dry wires. A flood gate controller is connected between the fence and the flood gate by a cut-out switch. If the line is submerged for long periods, the power should be shut off to submerged wires with a cut-off switch.

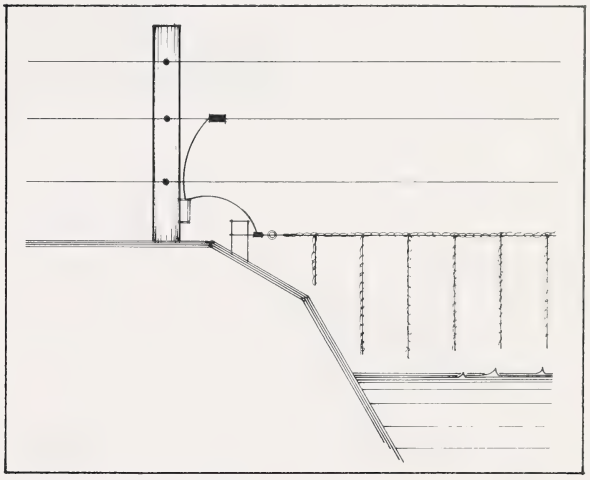


Figure 29. Flood gate.

STOCK TRAINING

Some farmers have successfully introduced stock to electric fences by running a single wire 300 mm (12 in.) out from an existing fence, for example, a good page wire or plank fence. The wire is 300 mm (12 in.) off the ground regardless of stock size. Animals are placed in the holding area for 24 to 36 hours, a small training area (corral) works best, because it ensures more contact with the fence. They quickly associate the electric wire with shock and the fence then becomes an impenetrable barrier. If a field has been subdivided, leave the gate open after stock are let in—this allows them time to adjust to the fence and learn where the gates are without being under pressure. Common sense in the initial period is most important. If a small group of animals is separated from a large group by a new fence there will be a natural tendency for the smaller group to join the larger group. This situation should be avoided while stock are being trained. If one renegade animal sets a bad example for others, take it out of the herd or flock for a while. Regular contact with electric fencing is important for continued stock training and control; in other words—the more electric fencing you have, the better it will work. One should aim in the long term to have 40 percent of fences electrified, either partially or totally.

TROUBLE SHOOTING

When an electric fence does not perform properly, the first step is to discover whether the fault is in the fence or the energizer.

Electric Fence Energizers
Disconnect the energizer from the fence. If the energizer now operates properly, the fault is with the fence. If the energizer does not operate, make sure it has power coming to it, check the batteries and terminals for corrosion. If it is a plug-in unit check the fuse in the energizer. If you are sure there is power and it still doesn't work, take the energizer back to your authorized dealer.

If the energizer works when the fence is disconnected then check the fence for faults.

Common faults are:
- Loose or corroded connections.
- Broken or dirty insulators.
- Dead short (metal to metal or metal to ground). It is not likely that a short is caused by vegetation next to the fence unless the growth is extremely heavy and over a large length of fence.
- Inadequate grounding system (the ground may be too dry).
- Reverse terminals on certain energizers in case the polarity is different.

Cold Weather Operation
If an energizer does not operate satisfactorily when it is very cold, mount the energizer on an inside wall or on a well insulated wall inside a building. If you can't mount the energizer indoors construct an insulated weatherproof plywood box and hang a 25-60 watt light bulb inside this box.

HINTS

- A neon fence tester or a peak-reading voltmeter can be helpful in locating a major problem, such as a short, or grounding problems. These are available through electric fencing suppliers.
- Use a radio to determine where arching is occurring, by turning the radio away from the main station and adjusting the volume so that a "click" can be heard. The "click" will remain constant until approaching a point where arching is occurring, then the volume will increase considerably.
- Cutout switches can be used to help isolate a fault by disconnecting sections of fence.
- Sometimes loss of power is the result of several minor things which must be repaired for effective operation.

MAINTENANCE

When the electric fence is not carrying an effective shock, the fence is no longer stockproof. Therefore, electric fences require regular attention for proper operation.

- Thoroughly inspect and repair the fence components once a year. After heavy wind storms check for fallen debris along the fence.
- Fence voltage should be checked often at different points along the line. Use a meter or neon tester to check for voltage leaks caused by grounding, weed growth, etc. A meter reading of at least 3,500 volts is required.
- Low energy energizers will not handle electric fences with long runs or heavy weed growth. Herbicide or other methods of vegetation control will be necessary.
- Proper wire tension is the key to success of high tensile electric fences. Seasonal temperature changes cause some expansion and contraction of the wire. Therefore, tension should be checked and adjusted, if necessary, twice a year.

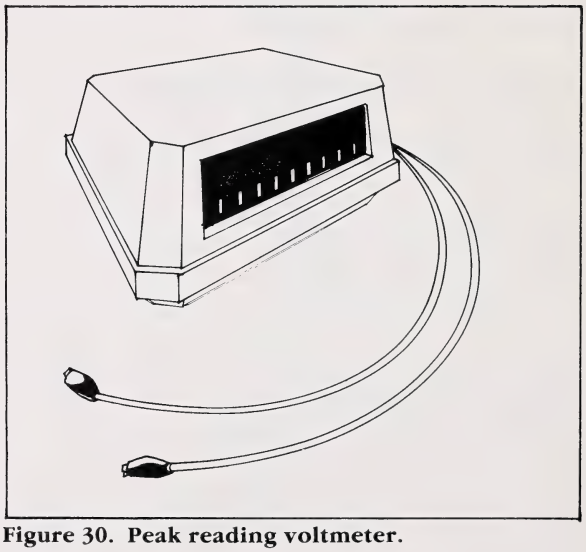


Figure 30. Peak reading voltmeter.

Figure 31. Electric fence signs should be placed every 100 m (300 ft).

SAFETY

Using a high voltage is not dangerous, provided that the pulse has a very short duration. The energy delivered by each pulse is many times less than that likely to kill or harm an animal or human. Even though the body is strongly affected by a pulse, the delay of one second between pulses is sufficient to recover and to pull oneself away from the fence.

* Remember—even before any wire is energized, it is an excellent conductor. Be careful, when stringing wires to ensure that they do not come in contact with power lines overhead.

* Keep away from fences during thunderstorms.

* Have all 110 volt or 220 volt supply lines for plug-in energizers installed by an electrician according to Alberta Electrical Inspection Code.

* A lightning arrestor on the fence wire(s) should be installed in addition to the built-in lightning protection that the energizer is equipped with. For total protection of the energizer during lightning storms it should be unplugged and the ground and fence terminals disconnected from the energizer. But, remember to plug the energizer back to the fence after the storm has passed.

* Do not attempt to install any portion of an electric fence or to make repairs or adjustments with the electric current on. Be sure to disconnect the feed wires with cut-out switches to the segment of fence on which you are working.

* Where an electric fence runs in parallel to a High Voltage Transmission Power Line—contact the Utility Company responsible, as they will assist with the proper grounding procedures involved.

* Keep farm equipment and any livestock tethered with chains away from electric fences.

* DO NOT attempt to repair or modify any electric fence energizer yourself. Return it to your authorized dealer for service.

* **Electric Fence Signs** - It's a good idea to affix easy-to-read signs on the fence not exceeding 100 m (300 ft) intervals, warning that the fence is electrified.

SUMMARY

While it is not new, high-tensile wire fencing is an evolving technology and new applications and improvements in design and construction techniques are being developed. While every effort has been made in the publication to convey the current state of art; it is indeed possible that all answers to all questions have not been included. For more information contact your regional engineer, regional technologist, or district agriculturist.

Regional engineers and regional technologists are located at the following offices:
Airdrie
Red Deer
Vermilion
Lethbridge
Fairview
Barrhead

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  Cornell University, Ithaca, N.Y. 14853

* Gallangher Power Fencing Systems
  P.O. Box 902
  1180 - 20 Street East
  OWEN SOUND, Ontario
  N4K 6H6

* Prairie Agricultural Machinery Institute (P.A.M.I.)
  P.O. Box 1900
  HUMBOLDT, SK
  S0K 2A0